PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : B65D 77/20, B29C 65/02

A1

(11) International Publication Number: WO 92/15498

(43) International Publication Date: 17 September 1992 (17.09.92)

(21) International Application Number: PCT/SE92/00112

(22) International Filing Date: 26 February 1992 (26.02.92)

(30) Priority data:
9100625-4 28 February 1991 (28.02.91) SE

(71) Applicant (*for all designated States except US*): PLM AB [SE/SE]; Djäknegatan 16, S-201 80 Malmö (SE).

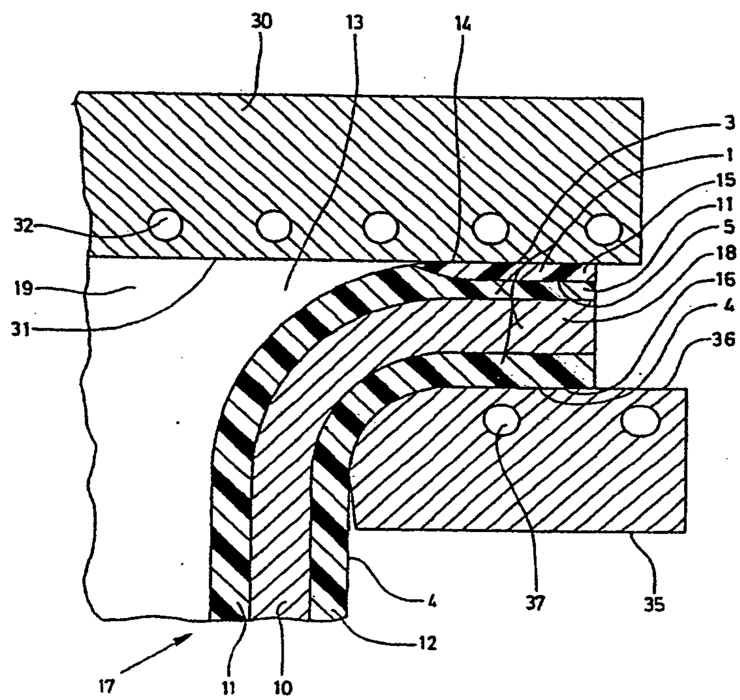
(72) Inventors; and
(75) Inventors/Applicants (*for US only*) : MAZZONE, Rolando [DK/DK]; Strandgyden 27, DK-5466 Asperup (DK). PEDERSEN, Jan, Rune [DK/DK]; Vesterdalen 10 F, DK-5260 Odense (DK). DYDENSBORG, Else [DK/DK]; Skovbakken 69, Skt. Klemens, DK-5260 Odense S (DK).

(74) Agent: MAGNUSSON, Gustav, L.; Magnupatent AB, Post Box 6207, S-200 11 Malmö (SE).

(81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), MC (European patent), NL (European patent), SE (European patent), US.

Published
With international search report.
In English translation (filed in Swedish).

(54) Title: CONTAINER AND METHOD OF CLOSING THE SAME



(57) Abstract

A container (17) of metal/plastic laminate, in which the plastic material in the laminate from which the container is produced consists of oriented material, is disposed so as to be tightly sealed by means of a sealing device in that the container is, in the contemplated fixing region (13) of the sealing device, provided with substantially non-oriented material. This is effected in that the material in the fixing region is heated to a temperature at least corresponding to that temperature at which orientation of the material is reduced. The containers form, in the fixing region (13), a fixing layer (15) of plastic material consisting of substantially non-oriented material which connects to oriented material and constitutes a layer integrated with the oriented material.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria
AU	Australia
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CS	Czechoslovakia
DE	Germany
DK	Denmark
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IT	Italy
JP	Japan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
LI	Liechtenstein
LK	Sri Lanka
LU	Luxembourg
MC	Monaco
MG	Madagascar
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
NL	Netherlands
NO	Norway
PL	Poland
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SN	Senegal
SU	Soviet Union
TD	Chad
TG	Togo
US	United States of America

CONTAINER AND METHOD OF CLOSING THE SAME

The present invention relates to a method of arranging a container for tight sealing thereof by means of a sealing device persuant to the preamble to claim 1, and a container disposed for such sealing persuant to the preamble to the independent product claim.

A technique has recently been developed for producing containers of metal/plastic laminate in which the metal is, as a rule, surrounded by polymer material included in the laminate. Examples of metals suitable for use in the metal/plastic laminates are tin-plate (steel-plate coated with a thin layer of tin) or ECCS (electrolytic chrome- and/or chromium-dioxide coated steel). Examples of polymer material are polyamide, polyester, for example polyethylene terephthalate and polypropylene.

The employment of metal/plastic laminate is conditioned by the requirement that, in many practical applications, it is vital to prevent direct contact between the metal and the ambient surroundings of the container, or between the metal and the contents stored within the container. The outer polymer layer protects the metal from, for example, corrosion damage and consequential leakage, or consequential unattractive appearence. Metal/plastic laminates with inner polymer layer are employed when the contents and/or the metal have such properties that the contents and/or the metal would be damaged on direct contact. The damage to the contents could, for example, entail that they cannot be used for their intended purpose, or that they would become wholly unusable. In the storage of foods or beverages, leakages generally entail that the contents stored in such a container must be rejected entirely. Beverages or foods stored in such a way may also, by contact with the metal, be tainted in an undesirable manner or have an unappetizing appearance.

As a rule. the sheet metal in the metal/plastic laminate is of a thickness of the range of between 50 and 700 µm while the thickness of the polymer generally lies in the range of between 5 and 200 µm. preferably in the range of between 10 and 100 µm. and generally in the range of between 10 and 50 µm. The thickness depends upon that polymer which is employed.

On sealing of containers, use is often made within the packaging sector of a technique according to which the container body is provided with a flange. for example an inwardly or outwardly directed flange, against whose upper face a sealing device of plastic material. for example a seal. a flat top. etc is secured. The flange consists. in such an instance. of a bent portion of the remaining edge region of the container body. For reasons of production. it is desirable that the flange consists of a portion integral with the container body and not a separate portion which is secured to the container body. In this latter case. production costs will be higher. at the same time as the joint between the flange portion and the container body entails increased risk that the container will leak.

It has proved possible. employing conventional technique and while maintaining a tightness of the polymer layer, to realize the desired shaping (bending) of the upper edge region of the container body. On the other hand. it has not proved possible. using conventional and prior art techniques. to seal containers of metal/plastic laminate with a bent upper flange by means of a sealing device of plastic material, and at the same time obtain a tight seal. The term "sealing device of plastic material" is taken to signify. apart from lids of plastic material, foils. laminates. films etc. The sealing devices include. in certain practical versions. also a layer of barrier material. for example of a metal. In all cases. the sealing device has at least one layer of a polymer which is disposed most proximal the flange of the container. It has. granted. proved possible to achieve a

tight connection with the substrate on the application of previously known and conventional anchorage technology in which mechanical devices are employed, for example, to press the sealing device against the substrate and at the same time supply energy thereto. However, it is necessary in such an instance to employ such a large supply of energy, for example such an elevated temperature, that the sealing device becomes deformed or is damaged in connection with its being fixed to the container. As a result, the final seal will either be untight or, in those cases when it is a tight seal, the sealing device will be deformed to such an extent that an appearance which is unacceptable to the consumer (the buyer) will be imparted to the container.

The term sealing device of plastic material has been employed above, and examples of sealing devices have also been cited. Hereinafter, the designation foil will generally be employed without any restrictive significance for the sealing device which is secured to the substrate. The structure of the foil varies from version to version and, in certain practical versions, consists of one of more layers of plastic material or of a combination of plastic/metal layer. In multi-layer foil, the layers consist, for example, solely of plastic material, the composition of the material generally varying from layer to layer, while in other practical versions, one or more of the layers may consist of, for example, metallic material, of barrier material, etc. On that side of the foil which is secured to the substrate, the foil is, however, always defined by a material layer which is intended, by heating, to adhere to the substrate. Examples of plastic material which are particularly suited for use in the sealing device are pure plastic materials, including copolymers and mixtures of plastic materials in which, in certain practical versions, the sealing device has a thin layer of welding material.

In many contexts - in particular in the packing of beverages or foods - the consumer wants a container that is easy to open. The term easy to open relates, in this description, to a container which may be opened in that, on opening of the originally sealed container, the sealing device is removed from the container since the sealing device is wholly or partly torn away from the container. On opening of the container, the connection between the sealing device and the container

is, for example, broken in that connection means which secures the sealing device to the container. The above-disclosed damage and/or leakages on sealing of metal/plastic laminate also occur in such practical applications.

The present invention relates to a method and a container in which the above-outlined problems and drawbacks have been obviated and in which such anchorage of the sealing device is achieved that this is continuously and sealingly secured to the container at the same time as the sealing device may, as a rule, be released from the container in that the connection between the sealing device and the container is broken in association with the adhesion layer which retains the sealing device to the container. This is achieved according to the technique defined in the process according to the characterizing clause of the independent method claim and the container according to the characterizing clause of the independent product claim.

An essential feature of the present invention is that it has surprisingly proved possible to form, in the contemplated anchorage region of the metal/plastic laminate, an anchorage layer of substantially unoriented plastic material. In the originally sealed container, this layer constitutes a connecting layer between the container body (the flange) and the foil. By arranging the layer as substantially non-oriented material, it is possible to apply conventional techniques for sealingly securing the foil. The peelability desired in many practical applications will also be achieved.

For creating the fixing layer of substantially unoriented material, energy is supplied to that material region of the container at which the foil is to be fixed. This region will hereinafter generally be referred to as fixing region. The supply of energy takes place, for example, by means of a mechanical device, for instance, a hot plate, which displays an abutment surface which abuts against the contemplated fixing surface for a predetermined time interval, the abutment surface being at a temperature in the range of or exceeding the temperature at which the orientation of the polymer material of the fixing layer begins to cease.

It might be expected that it would not be possible to realize, in the metal/plastic laminate, the desired temperature elevation of the surface layer of the plastic material, since the thickness of the plastic material is slight, at the same time as the polymer is fixed against a metal which, after all, possesses superior thermal conductivity. Similarly, it might be expected that the adhesion of the plastic material to the metal would be jeopardized. However, it has surprisingly proved possible, by a selection of temperature and abutment time, to achieve the desired effect, namely heating of the polymer to a temperature at which the material is disoriented and maintenance of the temperature of the polymer for such a length of time that the material in the fixing region changes to becoming substantially amorphous. The term substantially amorphous is here taken to mean a crystallinity of the polymer which, in polyester such as PET or in polyamides, amounts at most to approx. 10 %. It has also surprisingly proved possible to realize the contemplated heating of the polymer without destroying the bond between the polymer and the metal.

In certain practical applications, the polymer is maintained at elevated temperature for such a length of time that the material crystallizes thermally. In such instance, the material achieves a crystallinity exceeding approx. 10 %, as a rule exceeding approx. 15 %. Employing polyester, in certain practical applications crystallization is allowed to continue for such a long period of time that the material becomes opaque.

It has been disclosed above that the heating of the polymer takes place by abutment against mechanical devices. However, in certain practical versions, heating is effected in that the contemplated fixing surface is exposed to a radiation, e.g. light radiation or thermal radiation. Heating by means of a flame, by means of hot air, or by ultrasonic means are also applied in certain embodiments. In certain practical applications, radiation is at a frequency which is selected such that the plastic material prevents the radiation from passing therethrough. In such an instance, heating and disorientation take place in a surface stratum of the polymer layer, while the

the stratum most proximal the metal substantially retains its temperature and thereby its orientation. The bonding of the stratum to the metal will, thus, not be exposed to any appreciable action, either in that the viscosity of the polymer material most proximal the metal is reduced and the bond to the metal runs the risk of ceasing, or in that the oriented material most proximal the metal shrinks in connection with the heating operation. Naturally, corresponding effects are achieved by means of mechanical abutment devices by a suitable combination of abutment time and surface temperature of the abutment device. Also in heating by means of hot air or flame, corresponding technical effects will be achieved by a suitable combination of the temperature of the air or the flame, and treatment time.

Additional preferred embodiments of the present invention are disclosed in the appended subclaims.

The present invention will now be described in greater detail hereinbelow with particular reference to a number of drawing figures. In the accompanying drawings:

Fig. 1 is a cross-section through a portion of metal/plastic laminate;

Figs. 2 and 3 are cross-sections through a bent mouth flange under abutment against a mechanical temperature conditioning device;

Fig. 4 is a cross section through a portion of metal/plastic laminate with a radiation transmitter, a hot air nozzle or a burner nozzle aimed towards the one defining surface of the metal/plastic laminate;

Figs. 5 and 5a are cross-sections through the mouth flange corresponding to the cross section of Figs. 2 and 3, once the temperature conditioning has been carried out;

Fig. 6 is a cross-section in which a foil abuts against a bent mouth flange and. for fixing the foil through the mouth flange, a mechanical device which presses the foil against the mouth flange; and

Fig. 7 is a cross-section through a mouth flange with a foil secured to the mouth flange.

Fig. 1 shows a portion 1 of metal/plastic laminate in an often employed embodiment in the practical application of the present invention. The laminate includes a layer 10 of metal which, on its one side, is surrounded by a first layer 11 of plastic material and, on its other side, by a second layer 12 of plastic material. Hereinafter, the designation metal sheet 10 will often be employed for the layer 10 of metal. The layers of plastic material are, by means of bonding layers 2, fixed to the metal sheet. The plastic material in the layers of the laminate is monoaxially or biaxially oriented. The laminate is defined by an upper defining surface 3 and a lower defining surface 4. The upper defining surface 3 of the laminate constitutes the outer defining surface 3 of the layer 11. In certain embodiments, the bonding layers consist of layers of adhesive agent, while in other embodiments the material in the layers 11, 12 is secured directly to the metal sheet 10. It is obvious to a person skilled in the art that, in certain practical applications of the present invention, the metal sheet is coated with plastic material on only its one side.

Fig. 2 shows a cross-section through a material portion 1 of a mouth portion 19 of a container 17 produced of metal/plastic laminate. The metal/plastic laminate has a structure corresponding to that described with reference to Fig. 1. In order to simplify this and subsequent Figures, the bond layers are, however, not shown. The edge of the mouth portion is outwardly bent (flared) to form a substantially horizontal mouth flange 18.

In Fig. 2, the container is supported by an upper abutment surface 36 of a carrier member 35 in that the lower defining surface 16 of the mouth flange 18 rests against the abutment surface 36. The carrier

member is of a configuration (form) which is adapted to the configuration of the container so that the container assumes a predetermined position and a substantially fixed location in the carrier member. In the Figure, the carrier member is shown in one embodiment in which it is provided with channels 37 for thermal medium.

Fig 3 shows a cross-section corresponding to that of Fig. 2 through the portion 1 of metal/plastic laminate, but in which the first layer 11 of plastic material includes, according to one embodiment of the present invention, a surface layer 15, which has been reformed so as to constitute an upper layer of substantially unoriented material. Hereinafter, the designation fixing layer 15 will generally be employed for the upper layer. The outer defining surface of the fixing layer corresponds to the upper defining surface 3 in Fig. 1 and has been given reference numeral 14. The material in the fixing layer has, by heat treatment, been disoriented and thereby obtained properties which entail that a sealing device, for a example a foil or a film, is fixed to the material in the upper layer when the sealing device is brought into abutment against the defining surface 14 of the fixing layer and energy is supplied to the region of abutment. The fixing layer 15 is, in the embodiment illustrated in Fig. 3, of slighter thickness than the first layer 11 of plastic material, i.e. the fixing layer does not reach down to the metal sheet 10.

Figs. 2 and 3 also show one example of a heating device 30. In a first embodiment, the device is disposed as a mechanical device provided with means 32 for adjusting its temperature, e.g. provided with electric heating wires or channels 32 for conveying thermal medium. In a second embodiment, the heating device is provided in the form of an ultrasonic transmitter 30. The heating device has an abutment surface 31 which is turned to face towards the carrier member 35. The heating device and/or the carrier member 35 are displaceble in relation to one another by drive means (not shown) to and from the positions shown in the Figures in which the heating device abuts against the upper defining surface 3 of the laminate, i.e. the flange. The heating device abuts against the metal/plastic laminate in the mouth portion, for transferring energy, e.g. thermal energy or energy in the form of

ultrasonic sound to the first layer 11 of plastic material. In Fig. 3 the irregular line 5 in the layer 11 intimates a transitional region between material which has been heated by the heating device 30 and material which has not been heated.

Fig. 4 shows the container 17 placed in the carrier member 35. Above the container, there is disposed a heating device 40 which is provided with a lens 41 for converging of a beam 45 of, for example, light or hot air, towards the surface 3 of the portion 1 of metal/plastic laminate disposed a distance therefrom. As a rule, the radiation is of a frequency or composition selected such that the plastic material substantially prevents the radiation from passing through the material. As a rule, the lens 41 is of a design which has been selected such that the radiation converging towards the surface 3 of the portion 1 is of banded appearence. The heating device 40 and the portion 1 are disposed to be displaced, by drive means (not shown), in relation to one another with substantially retained concentration of the beam towards the defining surface 3 of the portion. Reference numeral 15a marks the fixing layer of substantially unoriented material under formation. In certain practical applications, the heating device 40 consists of a burner, for example a gas burner from which departs a flame 45 directed towards the layer 11 of oriented plastic material.

Figs. 5 and 5a show cross-sections through the mouth region of the container 17 once the fixing layer has been formed. In Fig. 5, the fixing layer extends from the upper defining surface 3 of the material portion 1 a distance down towards the metal sheet 10 of the material portion. However, the fixing portion does not reach the metal sheet, but leaves a material region 25 between itself and the metal sheet consisting of non-disoriented material, i.e. material which has substantially retained its orientation. This embodiment of the present invention is particularly suited for use when the bonding between the first layer 11 of plastic material and the metal sheet runs the risk of being damaged if the material in the connection region (c.f. the connection region 2 in Fig. 1) is heated to that temperature which is required for the contemplated disorientation. It has surprisingly

proved possible, despite the slight thickness of the plastic material, to achieve the structure shown in Fig. 5 by adapting, for instance, the abutment time of the heating device 30 (c.f. Fig. 3) and the temperature of the abutment surface 31 to suit the properties of the relevant plastic material. The contemplated disorientation will thereby be achieved of the fixing layer 15 while retaining a certain orientation in the material region 25.

In Fig. 5a, the material has been kept at elevated temperature for such a length of time that all plastic material between the defining surface 3 of the first layer and the sheet metal material has been disoriented. It is obvious that the embodiment illustrated in Fig. 5a as a rule entails a larger process scenario, but on the other hand it requires that the bond between the plastic material of the first layer and the metal sheet remain intact at those temperature which occur in such instance in the material in the bonding region (the bonding layer 2).

Fig. 6 shows the container 17 carried by the carrier member 35 in that the flange 18 of the container rests against the upper defining surface or abutment surface 36 of the carrier member. A sealing device 6 which, as has already been disclosed in this description, is generally designated foil, is placed between the fixing layer 15 and an abutment surface 51 of a mechanical compression and heating apparatus 50 which is provided with channels 52 for thermal medium. The one defining surface 7 of the foil is turned to face the abutment surface 51, while its other defining surface 8 is turned to face the fixing layer 15. The compression and heating apparatus 50 and/or the carrier member 35 are movable in relation to one another by drive means (not shown in the drawing). Hereby, both of these devices are displaceble to the positions illustrated in Fig. 6 in which the foil 6 is pressed against the fixing layer 15 of the flange 18.

Fig. 7 shows a cross-section through the mouth region 19 of a container 17 which is sealingly closed by means of the foil 6. The mouth portion 19 of the container is provided with the flange 18 whose first layer 11 of plastic material includes a fixing layer 15 of

disoriented material. While the fixing layer is shown in the figure in one embodiment in which it does not reach the metal sheet 10, it is obvious to a person skilled in the art, that in certain embodiments the fixing layer reaches the metal plate as showed in Fig. 5a.

In the foregoing, the flange 18 has been shown in the figures as a substantially horizontal flange. It will, however, be obvious to a person skilled in the art that, in other embodiments, the flange may have any optional orientation which also includes the possibility that the flange be inwardly directed, i.e. directed towards the centre axis of the mouth. In certain practical applications, it is rolled-up and thereby forms an outwardly or inwardly bent definition of the mouth opening of the container. The fixing region 13 for the sealing device, and thereby the fixing agent (the fixing device), for example a weld connecting the sealing device to the flange, is placed in such a position as is adapted to meet the relevant design of flange and sealing device. By way of example of such locations, placements in connection to the inner, upper, outer or lower surface of the flange might be mentioned.

On reduction of the present invention into practice, the fixing layer 15 is, in one preferred embodiment thereof, formed in that the plastic material, of oriented material in association with the contemplated fixing surface 14, is heated to a temperature located in the range of or exceeding that temperature at which the orientation of the material begins to be reduced. In practical applications in which the fixing layer is to consist of substantially amorphous material, the material is heated to melting, in which event the heating device is at a temperature which at least slightly exceeds the melting temperature. In such instance, the material which was oriented in the relevant region prior to heating is converted into a substantially non-oriented material which forms the fixing layer 15. As a rule, the heating time is limited such that the disclosed elevated temperature is only achieved for a relatively thin material zone (c.f. e.g. Fig. 5), which will thus be continued by oriented material in one cross-section.

The heating described in the preceding paragraph for forming the fixing layer 15 is, in certain embodiments, carried out by means of the mechanical heating device 30 while, in other embodiments, the radiation device 40 or burner 40, respectively, is employed. On employment of the heating device illustrated in Figs. 2 and 3 for heating by contact against the material surface, the abutment surface of the heating device 30 has, in one preferred embodiment employed in polyester, for example PET, a temperature exceeding 160° C, generally exceeding a 190° C. The abutment time normally exceeds 0.1 s, as a rule 0.3 s. In certain embodiments, the mechanical heating device shown in the drawing figures is replaced by a roller over which the pertinent region of metal/plastic laminate rolls in order locally to be heated for forming the fixing layer 15. As a rule, the ambient surroundings provide sufficient cooling in order rapidly to cool the fixing layer to such a low temperature that the material therein will be substantially amorphous. In certain practical applications in which it is desired that the fixing layer be relatively thick, such equipment is supplemented with means for the positive cooling of the heated material. Such cooling is effected in certain practical versions by means of a jet or sheet of cooling air, while in other practical applications the material provided with the fixing layer is brought into abutment against a cooled mechanical device, e.g. a cooling roller. In applications in which the connecting layer 2 between the plastic material and the metal sheet withstands high temperatures, use is generally also made of the superior thermal conductivity of the metal for conveying of thermal energy from the contemplated fixing layers.

The material formed with the fixing layer is thereafter placed together with the foil between the carrier member 35 and the compression and heating apparatus 50, the foil being given a placement which implies that it is located between the fixing layer 15 and the heating apparatus 50. The compression and heating apparatus 50 and the carrier member 35 are subsequently displaced towards one another so that the foil 6 is pressed against the fixing layer 15, at the same time as heat is supplied from the apparatus 50. In this instance, the foil adheres to the fixing layer 15 and the desired bonding with

substantially non-oriented plastic material is achieved. In certain practical applications, the heating device 30 with whose help the fixing layer 15 is formed is substituted by the compression and heating apparatus 50 which, in a first operative step, abuts directly against the upper defining surface 3 of the material portion 1 for forming the fixing layer 15, whereafter this abutment ceases in that the apparatus and the material portion 1 are displaced in relation to one another such that the distance of the apparatus to the defining surface (the fixing surface 14) is increased so as to permit insertion of the foil 6. In a second step, the compression and heating apparatus 50 is used for fixing the foil against the fixing layer 15 in accordance with techniques described above. In certain embodiments, also the compression and heating apparatus 50 consists of an ultrasonic device, the sonotrode of the ultrasonic device forming the compression apparatus.

According to the invention, on formation of the fixing layer (the surface layer) 15, the effect of the supplied energy is relatively great. Since the plastic material has relatively slight thermal conductivity, a rapid heating takes place of material in a region close to the surface of the layer (the future fixing surface), at the same time as the low thermal conductivity of the material results in the temperature gradient becoming great in relation to the subjacent oriented material. The supply of energy is discontinued after a period of time which is determined by the thermal conductivity of the material and, as a rule, is selected such that only a thin layer of material under the fixing surface reaches such elevated temperatures that the orientation of the material substantially ceases. The remaining portion of the material, seen in a cross-section therethrough, is heated to but a slight degree and, as a result, retains its orientation and constitutes a dimension-determining carrier layer for the fixing layer. Since adhesion of the carrier layer to the metal sheet remains intact, the fixing layer 15 will be created without any deterioration in the properties of the carrier layer in respect of mechanical strength, refractory durability, configurational stability etc.

In practical applications in which it is desired that the material in the fixing layer substa tially in (or at least in the region adjacent) the fixing surface is to consist essentially of amorphous material or of material with low thermal crystallization, heating of the fixing layer takes place such that the material melts, whereafter the material in the fixing layer is, immediately after heating, rapidly cooled to a temperature below the crystallization temperature. This is effected, for example, by the employment of mechanical devices which are in contact with the material of the fixing layer, and which, at least in the contact regions, consist of material areas possessing superior thermal conductivity. Through, for instance, cooling channels, these material regions of the mechanical devices are kept at a low temperature, e.g. at 0° C. In embodiments in which the fixing layer is to include plastic material of high thermal crystallinity, the material is kept at a temperature at which the material crystallizes thermally for such a length of time that the sought-for total crystallinity is achieved. In PET, crystallinity exceeding 10 % occurs, preferably exceeding 15 % and as a rule exceeding 20 %.

This technique is also applicable in embodiments of the present invention in which the sealing device 6, for example an aluminium foil 20, is provided with a layer 21 of material intended, after heating, to constitute the bonding agent between the aluminium foil and the mouth edge of the container.

In certain applications, the fixing layer is allowed to consist, at least partly viewed in cross-section, of crystallized material. In particular in one region of the fixing layer which, in cross-section, is located relatively far from the fixing surface, the poor thermal conductivity of the material entails that the heated material retains a temperature suitable for crystallization during such a length of time that the thermal crystallization continues so long that, in certain applications, the material in this region becomes opaque. It is obvious that opaque material will generally be obtained by adjustment of suitable combination of material temperature and crystallization time.

The designations "upper" and "lower" employed in the description have as a rule been used only to simplify the description and, in such instance, primarily relate to the positions of the devices or parts in the figures.

The above description has referred to but a limited number of embodiments of the present invention, but it will readily be perceived by a person skilled in this art that the invention encompasses a large numer of embodiments without departing from the spirit and scope of the appended claims.

CLAIMS

1. A method of arranging a container (17) of metal/plastic laminate in order tightly to seal the container by means of a sealing device, in which the container is, in one region (13) of the intended bonding with the sealing device, the fixing region (13) of the container, provided with a layer (11) of plastic material forming an outer defining surface (14), with which layer the sealing device is tightly united on sealing of the container, characterized in that oriented plastic material included in the fixing region of the container is disoriented in that the material, by energy supply, is heated to a temperature in the region of or exceeding that temperature at which orientation of the material is reduced; and that the disoriented material is, in a fixing region, given an extent comprising at least one surface stratum (15) of the layer (11) of plastic material.

2. The method as claimed in Claim 1, characterized in that the heating for converting the oriented material into substantially non-oriented material takes place in a relatively thin fixing layer (15) located immediately beneath the outer defining surface (14) and constituting the surface stratum (15).

3. The method as claimed Claim 1 or 2, characterized in that the heating is effected by means of radiation and/or ultrasound at a frequency or of a combination selected such that the plastic material in the future fixing layer (15) is disoriented.

4. The method as claimed in Claims 1-3, characterized in that after heating of the fixing layer (15) the layer is kept at a temperature at which the material thermocrystallizes for such a length of time that the stratum forms a layer of thermocrystallized material, in polyester such as PET with a crystallinity exceeding 10 %, preferably exceeding 15 % and generally exceeding 20 %.

5. The method as claimed in Claims 1-3, c h a r a c t e r i z e d i n t h a t after heating of the fixing layer (15) the layer is kept at a temperature at which the material thermocrystallizes for such a length of time that the stratum forms a layer of thermocrystallized material, in polyester such as PET with a crystallinity at least corresponding to the crystallinity at which the material begins to become opaque.

6. The method as claimed in any one of Claims 1-5, c h a r a c - t e r i z e d i n t h a t the heating of the material of the fixing layer (15) is effected by means of a first mechanical device (30) which displays an abutment surface (31) which, at a temperature in the region of or exceeding the melting temperature of the material of the fixing layer (15), abuts against the fixing surface during a predetermined time interval.

7. The method as claimed in any one of Claims 1-6, c h a r a c - t e r i z e d i n t h a t the material of the fixing layer is, after heating, brought into abutment against a second mechanical device (30a) which displays an abutment surface (31a) at a temperature in the region of the thermocrystallization temperature of the material of the fixing layer; and that the abutment against the fixing surface (14) takes place during a predetermined time interval.

8. The method as claimed in any one of Claims 1-6, c h a r a c - t e r i z e d i n t h a t after heating of the fixing layer (15), the layer is rapidly cooled for the formation of a stratum of substantially amorphous material, in polyester such as PET preferably with a crystallinity of less than 10 %.

9. The method as claimed in any one of Claims 1-8 c h a r a c - t e r i z e d i n t h a t a circumferential mouth region (16) of a container (17) is temperature-conditioned so as to form the fixing layer (15).

10. The method as claimed in Claim 7, characterized in that the fixing layer (15) is formed in a mouth edge flange (18) of the container.

11. A container (17) of metal/plastic laminate intended to be sealed by means of a sealing device (6), in which the container is, in a region (13) of the contemplated bonding with the sealing device, provided with a layer (11) of plastic material forming an outer defining surface (14) with which layer the sealing device is tightly united on sealing of the container, characterized in that in the contemplated fixing region (13) the layer (11) of plastic material forms a fixing layer (15) of plastic material consisting of substantially non-oriented material; that adjacent the fixing layer (15) the layer (11) of plastic material consists of oriented material; and that the material in the fixing layer constitutes a layer integrated with the oriented material.

12. The container as claimed in Claim 11, characterized in that the fixing layer (15) extends from the outer defining surface (3) of the layer (11) to the layer (10) of metal.

13. The container as claimed in Claim 11 or 12, characterized in that the container is provided with a mouth flange (18) in which the fixing layer (15) forms a circumferential defining surface (14) to which the sealing device is intended to be connected.

14. The container as claimed in Claim 11 or 12, characterized in that the container is provided with a mouth flange (18) in which the fixing layer (15) constitutes an upper or a lower defining layer to which the sealing device is intended to be connected.

15. The container as claimed in any one of Claims 11-14, characterized in that the fixing layer 15 consists of thermocrystallized material with a crystallinity exceeding 10 %, preferably exceeding 15 % and generally exceeding 20 %.

16. The container as claimed in any one of Claims 11-14, characterized in that the fixing layer (15) consists of thermocrystallized material with a crystallinity at least corresponding to the crystallinity at which the material begins to become opaque.

17. The container as claimed in any one of Claims 11-14, characterized in that in the region (13) of the contemplated bonding with the sealing device, the fixing layer (15) comprises all material in the layer.

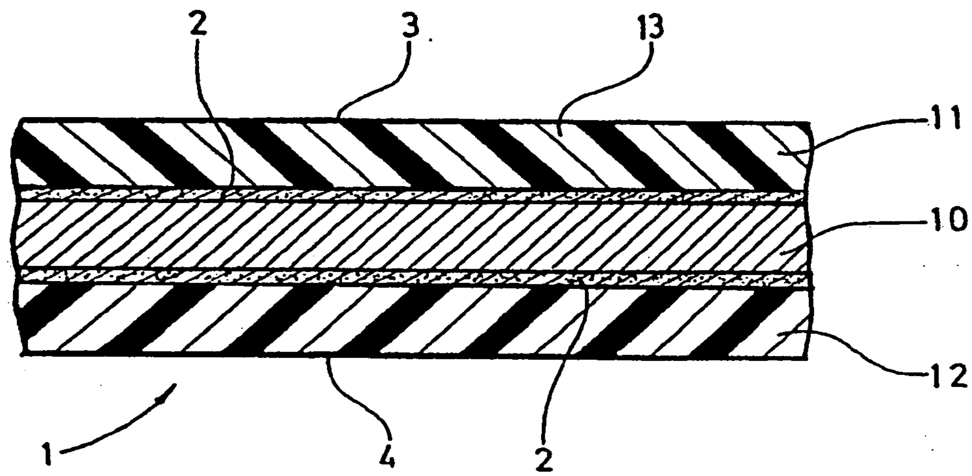


Fig. 1

SUBSTITUTE SHEET

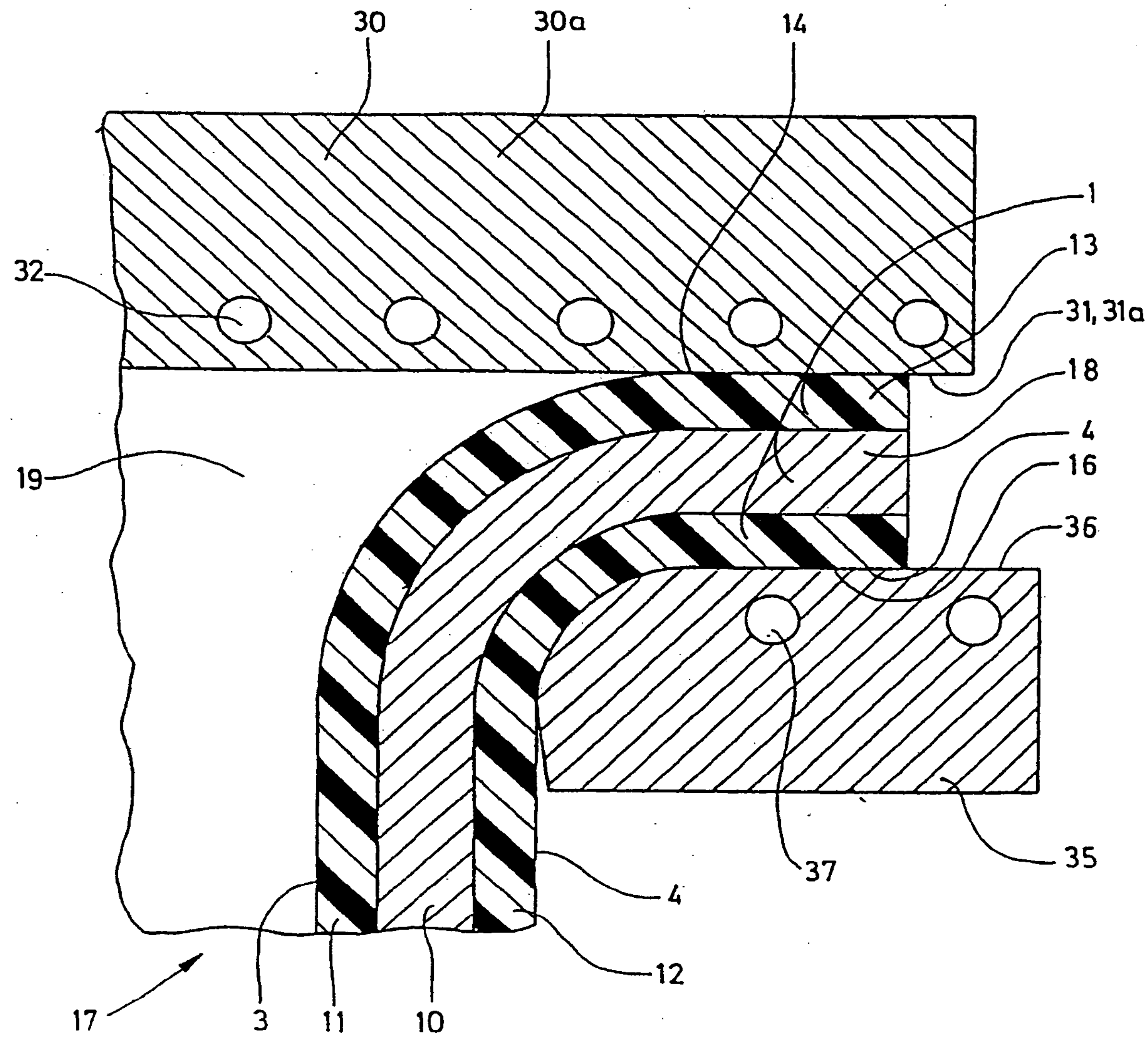


Fig. 2

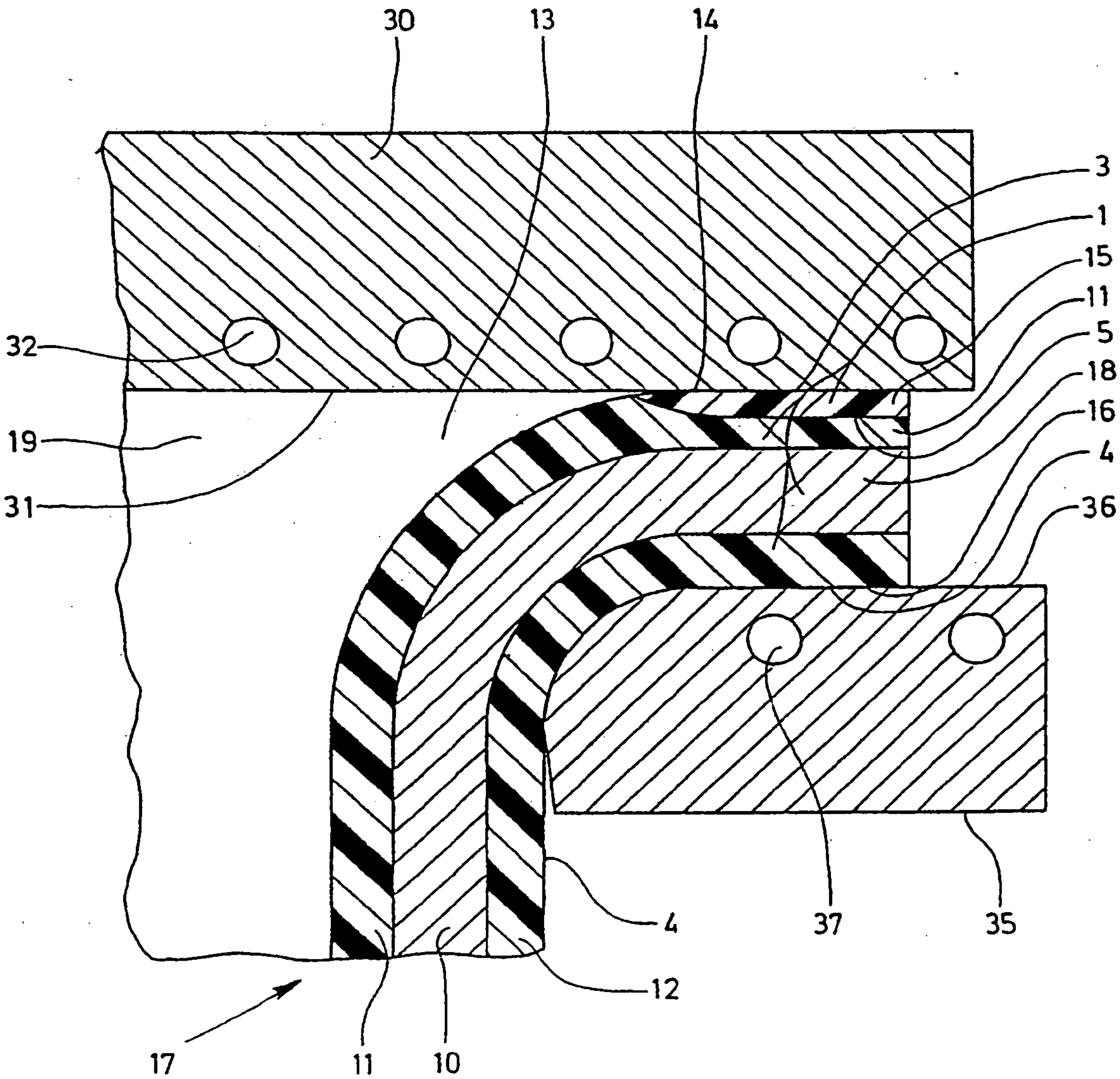


Fig.3

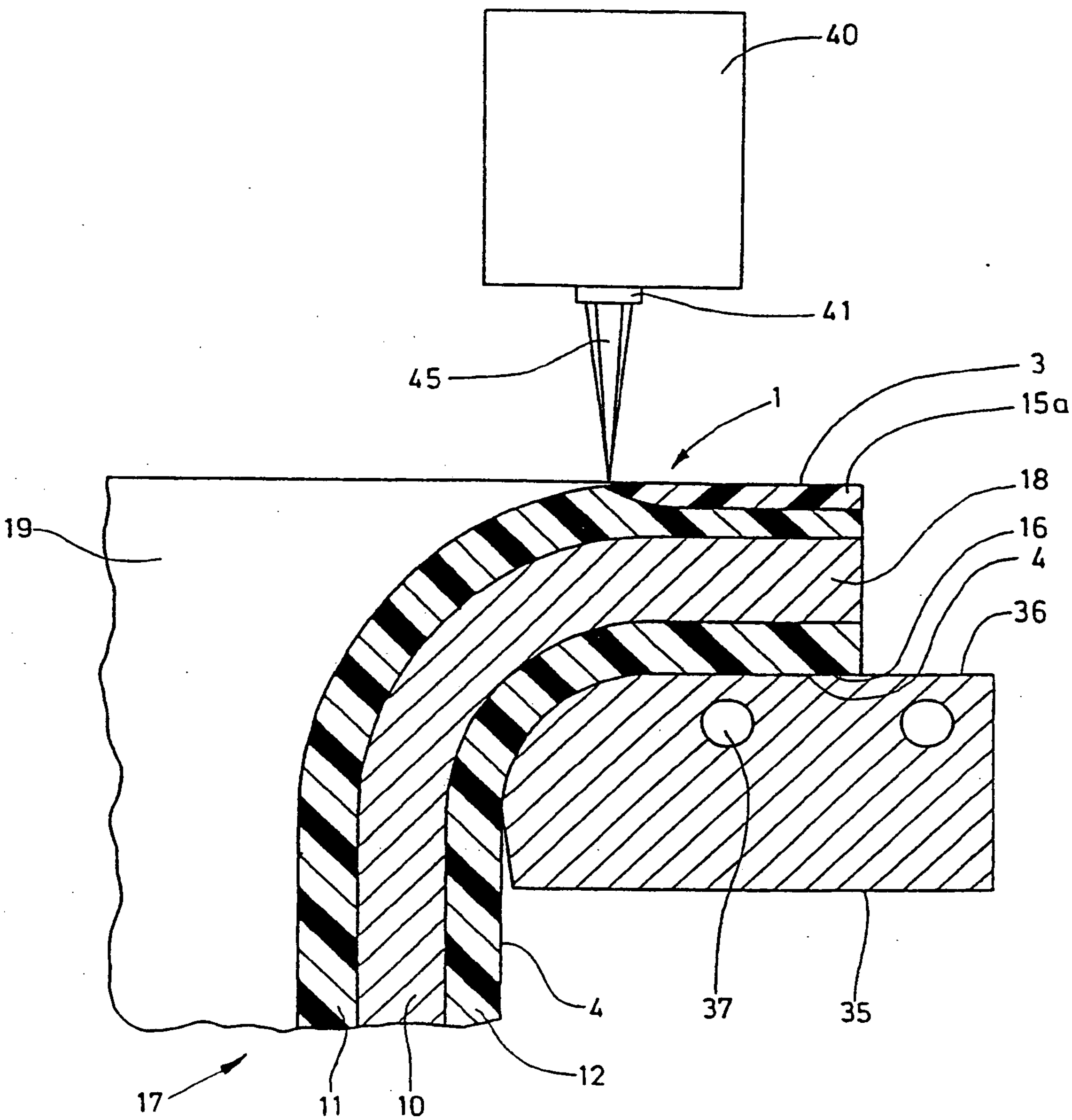


Fig.4

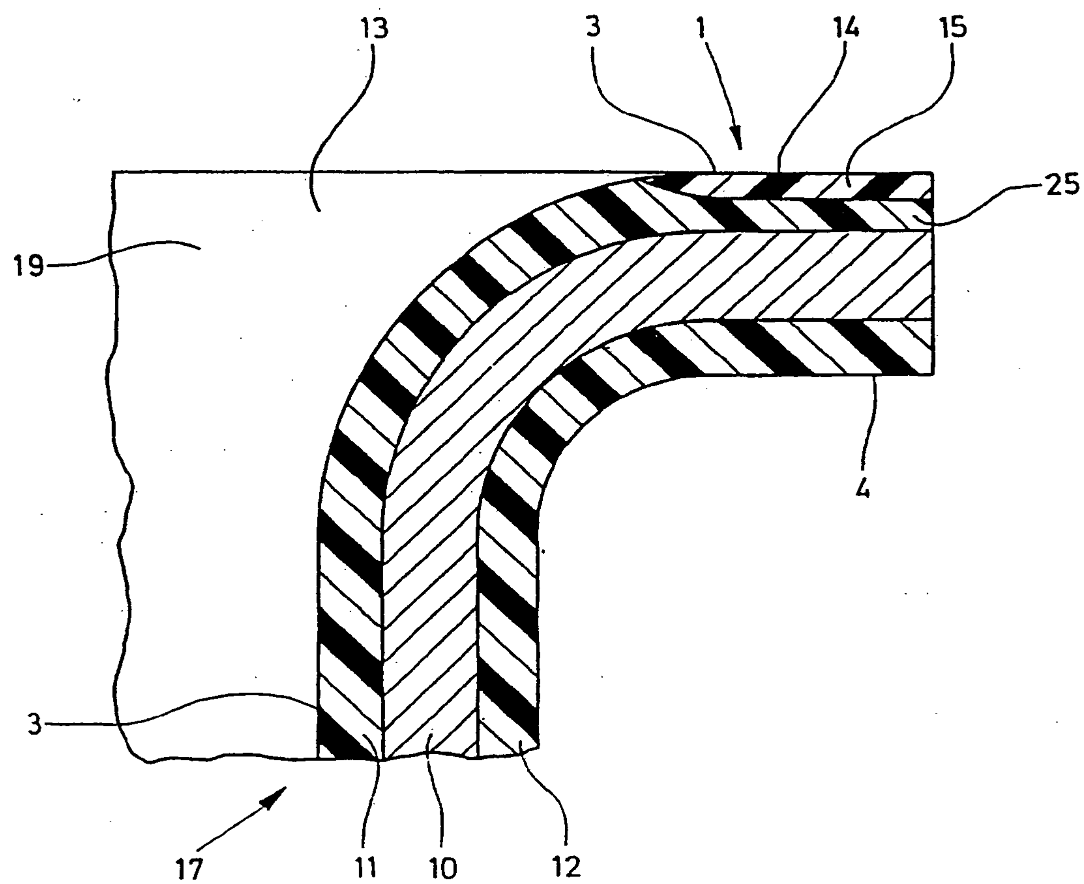


Fig.5

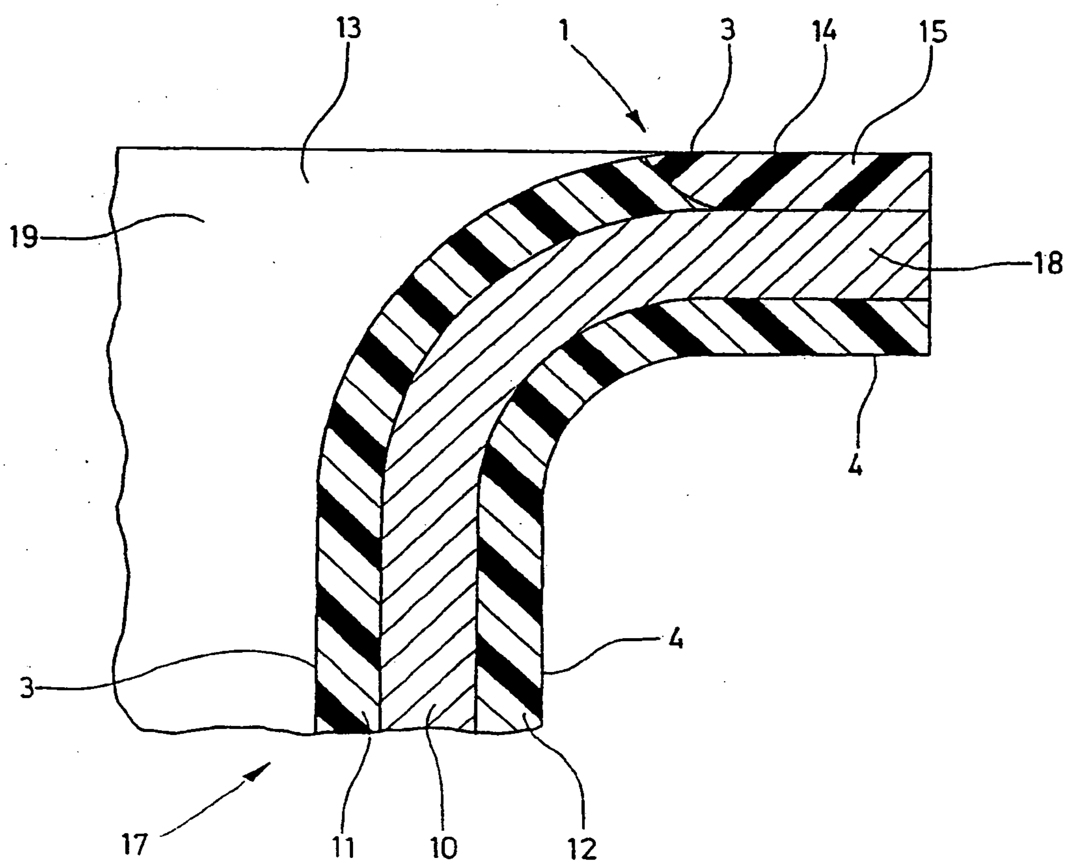


Fig. 5a

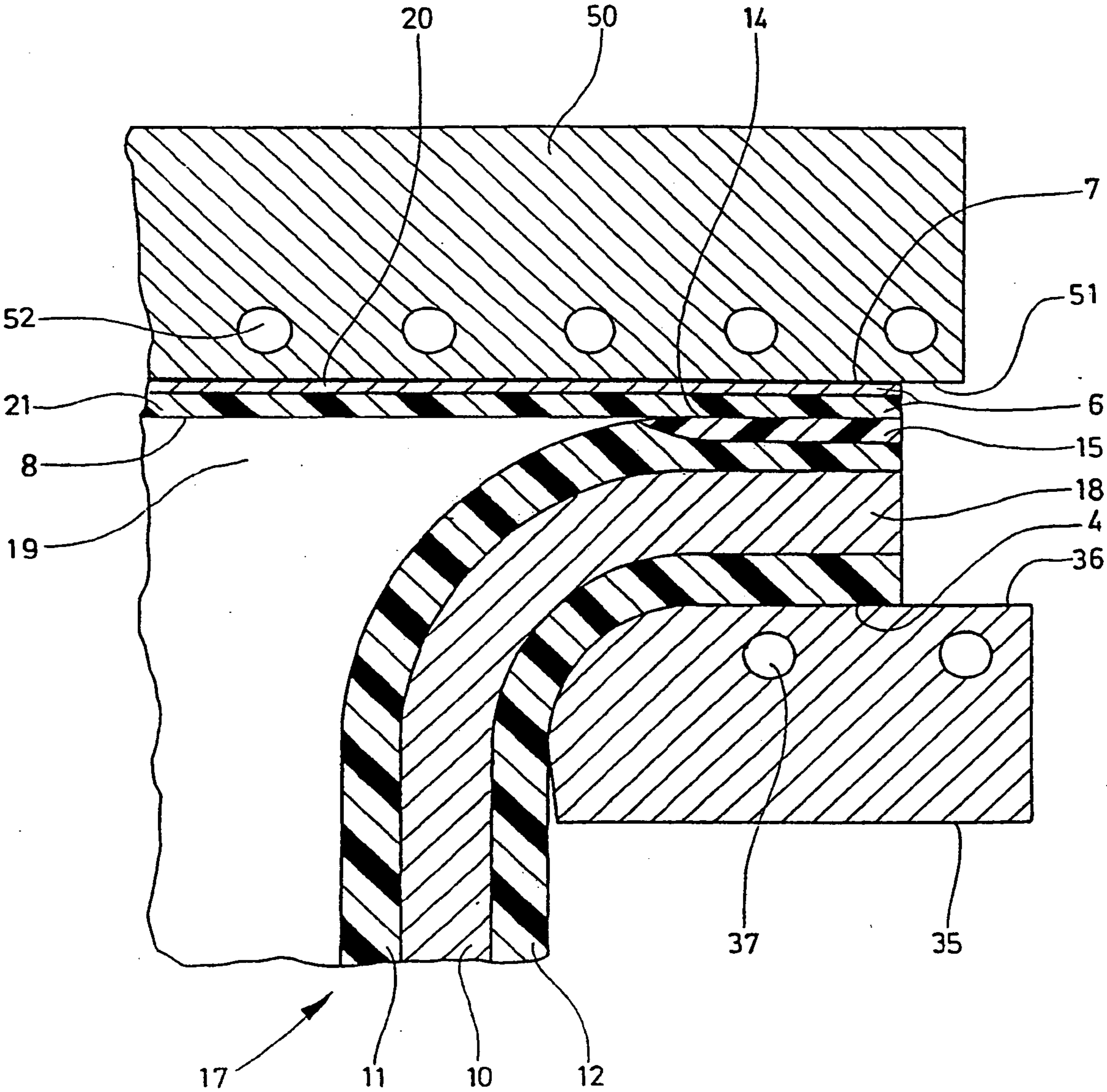


Fig. 6

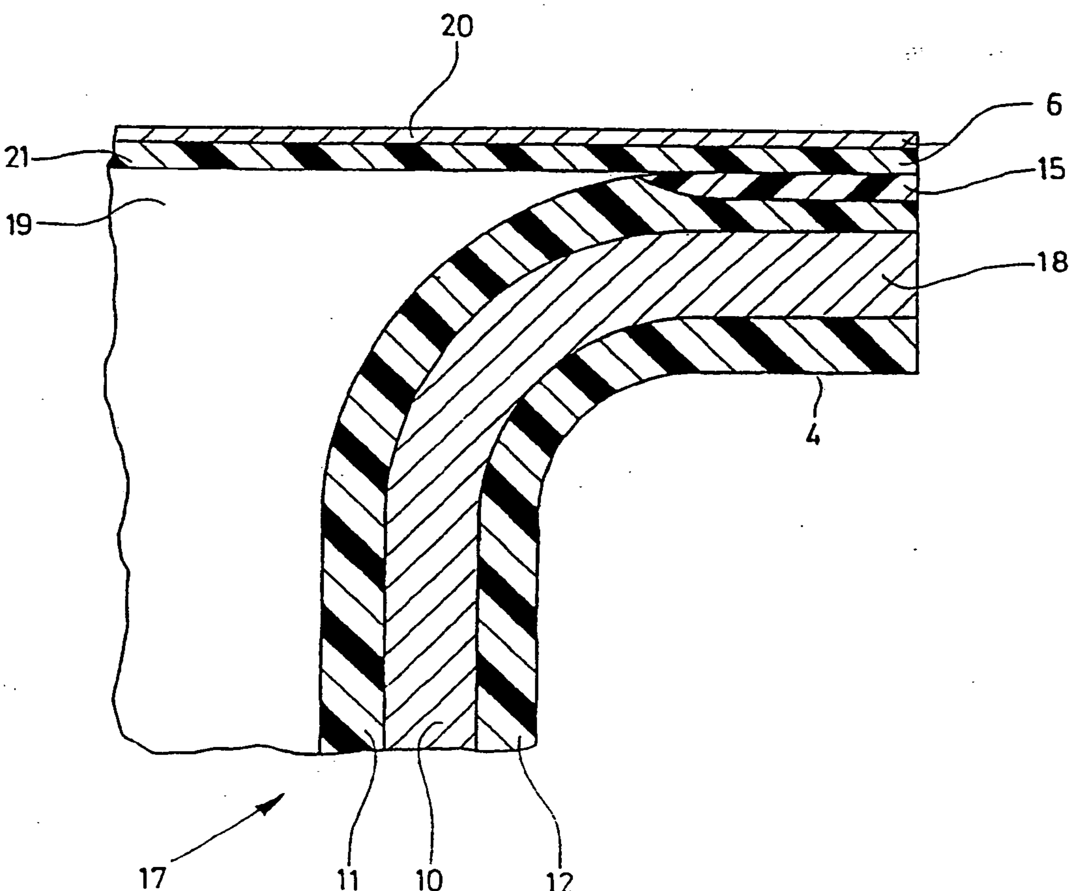


Fig. 7

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00112

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: B 65 D 77/20, B 29 C 65/02

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
IPC5	B 65 D; B 29 C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched[8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	SE, B, 456009 (PLM AB) 29 August 1988, see the whole document --	1-3,5-10
A	US, A, 4379014 (RAUSING ET AL) 5 April 1983, see the whole document --	1,8
A	EP, A, 0127466 (DAI NIPPON INSATSU KABUSHIKI KAISHA) 5 December 1984, see the whole document --	1,8
A	WO, A1, 9003886 (TOYO SEIKAN KAISHA. LTD) 19 April 1990, see the whole document --	1,8

* Special categories of cited documents:[10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
11th June 1992	1992 -06- 16
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Helena Åkerlund

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	FR, A1, 2008544 (SIDAPLAX S.A.) 23 January 1970, see the whole document --	1,8

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 92/00112

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 30/04/92
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
SE-B- 456009	88-08-29	AU-B-	597779	90-06-07
		AU-D-	1089388	88-07-15
		EP-A-B-	0278085	88-08-17
		EP-A-	0469633	92-02-05
		JP-T-	1501544	89-06-01
		SE-A-	8605443	88-06-19
		US-A-	4857369	89-08-15
		WO-A-	88/04637	88-06-30
		ZA-A-	8709516	88-06-16
US-A- 4379014	83-04-05	AT-E-T-	9662	84-10-15
		AU-D-	6353580	81-04-30
		CA-A-	1157362	83-11-22
		CH-A-	641089	84-02-15
		EP-A-B-	0027677	81-04-29
		JP-B-	1017856	89-04-03
		JP-C-	1532747	89-11-24
		JP-A-	56067230	81-06-06
EP-A- 0127466	84-12-05	DE-A-	3472936	88-09-01
		JP-A-	59221255	84-12-12
		US-A-	4724961	88-02-16
WO-A1- 9003886	90-04-19	GB-A-	2233917	91-01-23
		JP-A-	2258577	90-10-19
		JP-A-	1302710	89-12-06
FR-A1- 2008544	70-01-23	BE-A-	733212	69-11-17
		GB-A-	1206667	70-09-30
		NL-A-	6906893	69-11-18
		US-A-	3583125	71-06-08

REVISED VERSION *

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : B65D 77/20, B29C 65/02

A1

(11) International Publication Number: WO 92/15498

(43) International Publication Date: 17 September 1992 (17.09.92)

(21) International Application Number: PCT/SE92/00112

(22) International Filing Date: 26 February 1992 (26.02.92)

(30) Priority data:
9100625-4 28 February 1991 (28.02.91) SE

(71) Applicant *(for all designated States except US):* PLM AB [SE/SE]; Djäknegatan 16, S-201 80 Malmö (SE).

(72) Inventors; and
(75) Inventors/Applicants *(for US only) :* MAZZONE, Rolando [DK/DK]; Strandgyden 27, DK-5466 Asperup (DK). PEDERSEN, Jan, Rune [DK/DK]; Vesterdalen 10 F, DK-5260 Odense (DK). DYDENSBORG, Else [DK/DK]; Skovbakken 69, Skt. Klemens, DK-5260 Odense S (DK).

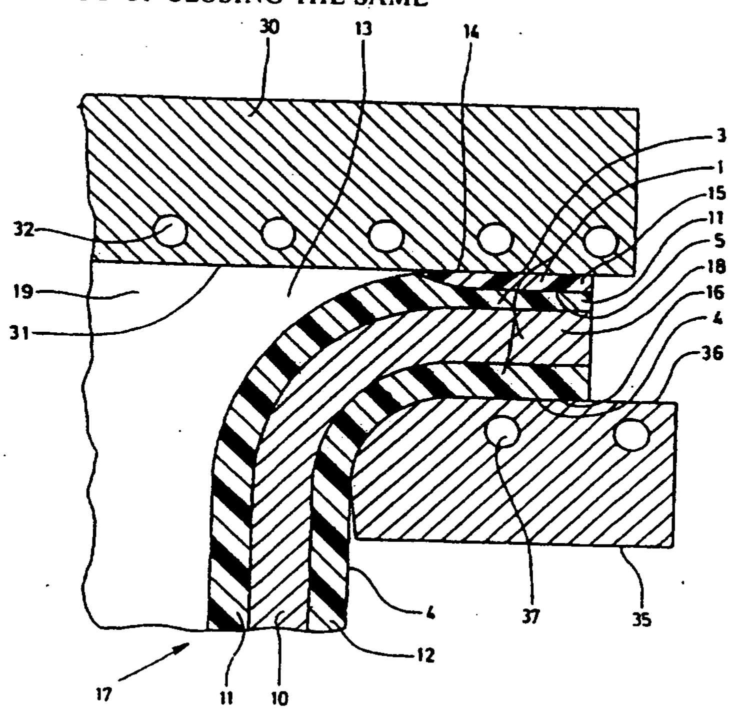
(74) Agent: MAGNUSSON, Gustav, L.; Magnupatent AB, Post Box 6207, S-200 11 Malmö (SE).

(81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), MC (European patent), NL (European patent), SE (European patent), US.

Published
With a revised version of the international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.
In English translation (filed in Swedish).

(88) Date of publication of the revised version of the international search report:
29 April 1993 (29.04.93)

(54) Title: CONTAINER AND METHOD OF CLOSING THE SAME



(57) Abstract

A container (17) of metal/plastic laminate, in which the plastic material in the laminate from which the container is produced consists of oriented material, is disposed so as to be tightly sealed by means of a sealing device in that the container is, in the contemplated fixing region (13) of the sealing device, provided with substantially non-oriented material. This is effected in that the material in the fixing region is heated to a temperature at least corresponding to that temperature at which orientation of the material is reduced. The containers form, in the fixing region (13), a fixing layer (15) of plastic material consisting of substantially non-oriented material which connects to oriented material and constitutes a layer integrated with the oriented material.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	MN	Mongolia
AU	Australia	FR	France	MR	Mauritania
BB	Barbados	GA	Gabon	MW	Malawi
BE	Belgium	GB	United Kingdom	NL	Netherlands
BF	Burkina Faso	GN	Guinea	NO	Norway
BG	Bulgaria	GR	Greece	NZ	New Zealand
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	PT	Portugal
CA	Canada	IT	Italy	RO	Romania
CF	Central African Republic	JP	Japan	RU	Russian Federation
CG	Congo	KP	Democratic People's Republic of Korea	SD	Sudan
CH	Switzerland			SE	Sweden
CI	Côte d'Ivoire	KR	Republic of Korea	SK	Slovak Republic
CM	Cameroon	LI	Liechtenstein	SN	Senegal
CS	Czechoslovakia	LK	Sri Lanka	SU	Soviet Union
CZ	Czech Republic	LU	Luxembourg	TD	Chad
DE	Germany	MC	Monaco	TG	Togo
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America

REVISED VERSION

INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00112

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC5: B 65 D; B 29 C

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
IPC5	B 65 D 77/20, B 29 C 65/02

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched[8]

SE,DK,FI,NO classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category *	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	SE, B, 456009 (PLM AB) 29 August 1988, see the whole document --	1-17
A	US, A, 4379014 (RAUSING ET AL) 5 April 1983, see the whole document --	1,11
A	EP, A, 0127466 (DAI NIPPON INSATSU KABUSHIKI KAISHA) 5 December 1984, see the whole document --	1,11
A	WO, A1, 9003886 (TOYO SEIKAN KAISHA. LTD) 19 April 1990, see the whole document --	1,11

* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26th March 1993	02 -04- 1993
International Searching Authority	**Signature of Authorized Officer**
SWEDISH PATENT OFFICE	Kerstin Hällgren

International Application No. PCT/SE 92/00112

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	FR, A1, 2008544 (SIDAPLAX S.A.) 23 January 1970, see the whole document --	1,11

Form PCT/ISA/210 (extra sheet) (January 1985)

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 92/00112

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the Swedish Patent Office EDP file on 26/02/93
The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
SE-B- 456009	88-08-29	AU-B-	597779	90-06-07
		AU-D-	1089388	88-07-15
		DE-A-	3777388	92-04-16
		EP-A-B-	0278085	88-08-17
		EP-A-	0469633	92-02-05
		SE-A-	8605443	88-06-19
		US-A-	4857369	89-08-15
		WO-A-	88/04637	88-06-30
		ZA-A-	8709516	88-06-16
US-A- 4379014	83-04-05	AT-E-T-	9662	84-10-15
		AU-D-	6353580	81-04-30
		CA-A-	1157362	83-11-22
		CH-A-	641089	84-02-15
		EP-A-B-	0027677	81-04-29
		JP-B-	1017856	89-04-03
		JP-C-	1532747	89-11-24
		JP-A-	56067230	81-06-06
EP-A- 0127466	84-12-05	DE-A-	3472936	88-09-01
		JP-A-	59221255	84-12-12
		US-A-	4724961	88-02-16
WO-A1- 9003886	90-04-19	GB-A-B-	2233917	91-01-23
		JP-A-	2258577	90-10-19
		JP-A-	1302710	89-12-06
FR-A1- 2008544	70-01-23	BE-A-	733212	69-11-17
		GB-A-	1206667	70-09-30
		NL-A-	6906893	69-11-18
		US-A-	3583125	71-06-08